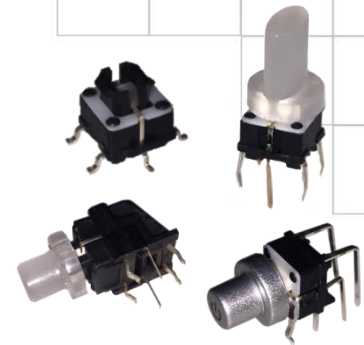




# Series 228A

## 7.2 x 6.8mm Illuminated Tactile Switch

- Surface mount gull-wing terminal and standard through hole configurations
- Compatible with IR reflow, and manual soldering
- Single color display during illumination
- Variety of LED color options
- Variety of cap styles, colors, and laser etching options



### Ordering Information

| Series  | Terminal Type  | Actuating Direction | Actuation Force | LED Color | LED Type                               | Cap Style | Cap Color                                | Laser Etching  | Packaging |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
|---|--|---------------------|-----------------|-----------|--|-----------|--|--|-----------|------|-------|---|----------|-----|---------------------------------|-----|---------------------------------|--|--|------|-------|---|-----|---|--------|---|------------|---|------|---|-------|---|-------|----|-------------|----|------------|----|----------------|----|-------------|----|---------------|---|--|------|-------|---|------|--------|------|--|--|--|--|------|-------|---|---|-------|--|
| 228A  | M  | V                   | A               | R         | F                                      | A         | MS                                       | A  | R         |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| <table><tr><th>Code</th><th>Spec.</th></tr><tr><td>D</td><td>Standard through hole (black actuator)</td></tr><tr><td>M</td><td>Surface mount gull wing (black actuator)</td></tr></table> |  | Code                | Spec.           | D         | Standard through hole (black actuator) | M         | Surface mount gull wing (black actuator) | <table><tr><th>Code</th><th>Spec.</th></tr><tr><td>V</td><td>Vertical</td></tr><tr><td>*S1</td><td>Side, with 4 pairs of terminals</td></tr><tr><td>*S2</td><td>Side, with 3 pairs of terminals</td></tr></table> <p>*S1 and S2 are only available with Cap Style. C, Flat LED, and through hole terminals</p> |           | Code | Spec. | V | Vertical | *S1 | Side, with 4 pairs of terminals | *S2 | Side, with 3 pairs of terminals | <table><tr><th>Code</th><th>Spec.</th></tr><tr><td>R</td><td>Red</td></tr><tr><td>Y</td><td>Yellow</td></tr><tr><td>G</td><td>Pure Green</td></tr><tr><td>B</td><td>Blue</td></tr><tr><td>W</td><td>White</td></tr><tr><td>A</td><td>Amber</td></tr><tr><td>RG</td><td>Red &amp; Green</td></tr><tr><td>RB</td><td>Red &amp; Blue</td></tr><tr><td>YG</td><td>Yellow &amp; Green</td></tr><tr><td>RA</td><td>Red &amp; Amber</td></tr><tr><td>AW</td><td>Amber &amp; White</td></tr></table> |  | Code | Spec. | R | Red | Y | Yellow | G | Pure Green | B | Blue | W | White | A | Amber | RG | Red & Green | RB | Red & Blue | YG | Yellow & Green | RA | Red & Amber | AW | Amber & White | <table><tr><th>Code</th><th>Spec.</th></tr><tr><td>F</td><td>Flat</td></tr><tr><td>*Blank</td><td>Bulb</td></tr></table> <p>*Blank is only available for no cap, vertical through hole terminal with single color LED</p> |  | Code | Spec. | F | Flat | *Blank | Bulb | <p>Blank – No Etching (only available on Natural color caps) See table on page.2</p> <p>Blank – No Cap See table on page 2</p> |  | <table><tr><th>Code</th><th>Spec.</th></tr><tr><td>R</td><td>Tape &amp; reel packaging (only available for surface mount type)</td></tr><tr><td>Blank</td><td>Tray packaging (only available for standard through hole type)</td></tr></table> |  | Code | Spec. | R | Tape & reel packaging (only available for surface mount type) | Blank | Tray packaging (only available for standard through hole type) |
| Code  | Spec.  |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| D   | Standard through hole (black actuator)                         |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| M   | Surface mount gull wing (black actuator)                       |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| Code  | Spec.  |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| V   | Vertical   |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| *S1   | Side, with 4 pairs of terminals                                |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| *S2   | Side, with 3 pairs of terminals                                |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| Code  | Spec.  |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| R   | Red  |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| Y   | Yellow   |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| G   | Pure Green   |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| B   | Blue   |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| W   | White  |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| A   | Amber  |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| RG  | Red & Green  |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| RB  | Red & Blue   |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| YG  | Yellow & Green   |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| RA  | Red & Amber  |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| AW  | Amber & White  |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| Code  | Spec.  |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| F   | Flat   |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| *Blank  | Bulb   |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| Code  | Spec.  |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| R   | Tape & reel packaging (only available for surface mount type)  |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| Blank   | Tray packaging (only available for standard through hole type) |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| <table><tr><th>Code</th><th>Spec.</th></tr><tr><td>A</td><td>160 gf</td></tr></table>   |  | Code                | Spec.           | A         | 160 gf                                 |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| Code  | Spec.  |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |
| A   | 160 gf   |                     |                 |           |  |           |  |  |           |      |       |   |          |     |                                 |     |                                 |  |  |      |       |   |     |   |        |   |            |   |      |   |       |   |       |    |             |    |            |    |                |    |             |    |               |   |  |      |       |   |      |        |      |  |  |  |  |      |       |   |   |       |  |

Note: Caps supplied in bulk for surface mount terminal constructions and must be installed after IR reflow soldering.

## Cap Style

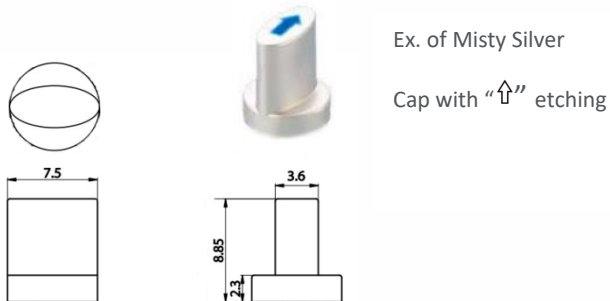
| Code | Spec.                          |
|------|--------------------------------|
| A    | Elliptical column on round     |
| B    | 45° Elliptical column on round |
| C    | Cylinder on 3/4 circle         |

## Cap Color

| Code | Cap Color    |
|------|--------------|
| MS   | Misty Silver |
| W    | White        |
| BB   | Bright Black |
| R    | Red          |
| MB   | Misty Black  |
| A    | Orange       |
| N    | Natural      |

## Cap Style Details

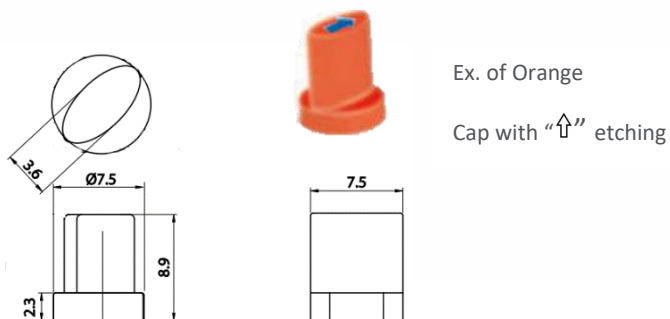
Style A: Elliptical column on round



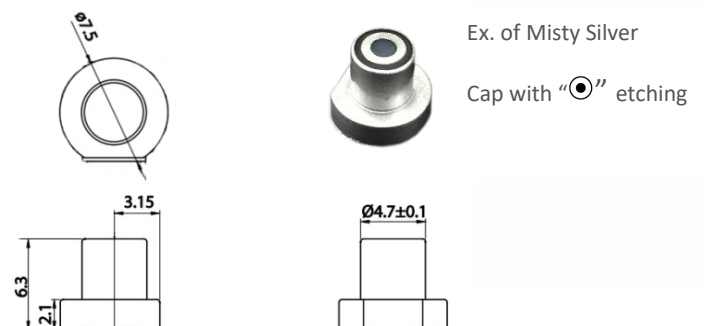
## Cap Etching

| Code | Style |
|------|-------|
| A    | ↑     |
| B    | ○     |
| C    | ↑     |
| D    | OK    |
| E    | ⦿     |

Style B: Elliptical column on round



Style C: Cylinder on 3/4 circle





## Electrical Specifications

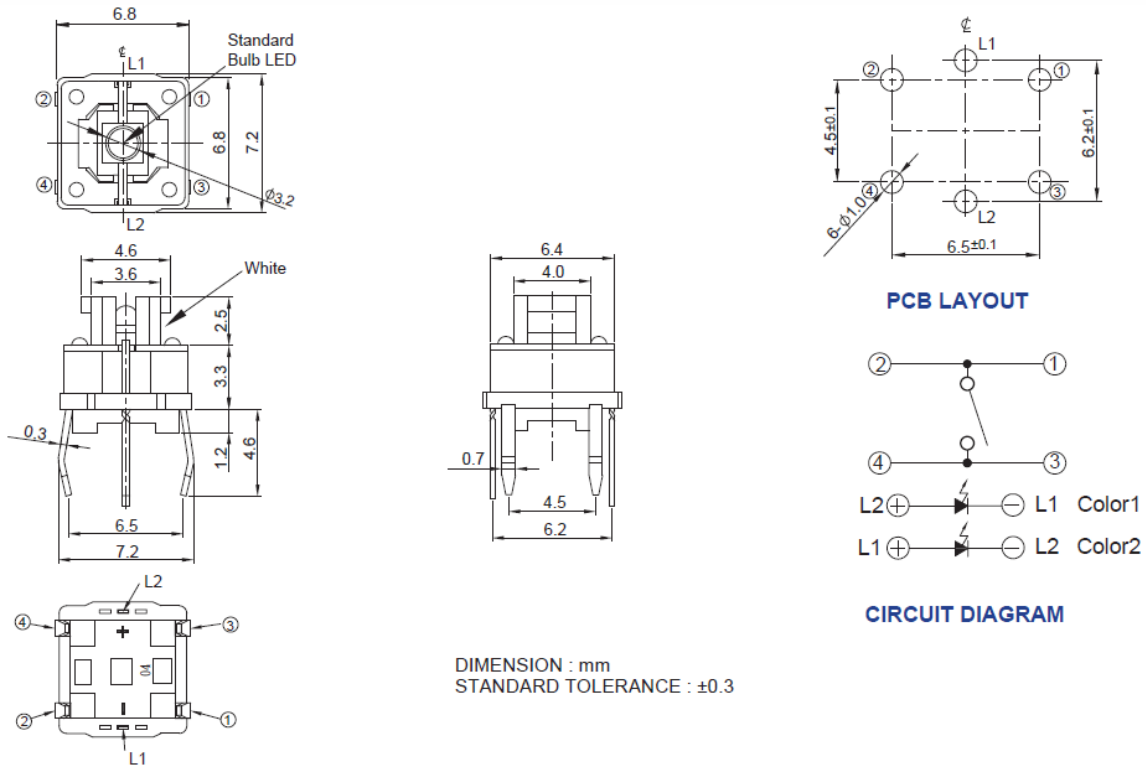
| Parameter             | Conditions & Remarks              | Min | Max            | Unit            |
|-----------------------|-----------------------------------|-----|----------------|-----------------|
| Contact Resistance    |                                   |     | 100            | milliohms       |
| Insulation Resistance | Between insulated terminals       | 100 |                | megohms         |
| Dielectric Strength   | 250 VAC between adjacent switches |     | 1              | minute          |
| Nonswitching Rating   |                                   |     | 50<br>or<br>12 | mA<br>or<br>VDC |

## Mechanical and Environmental

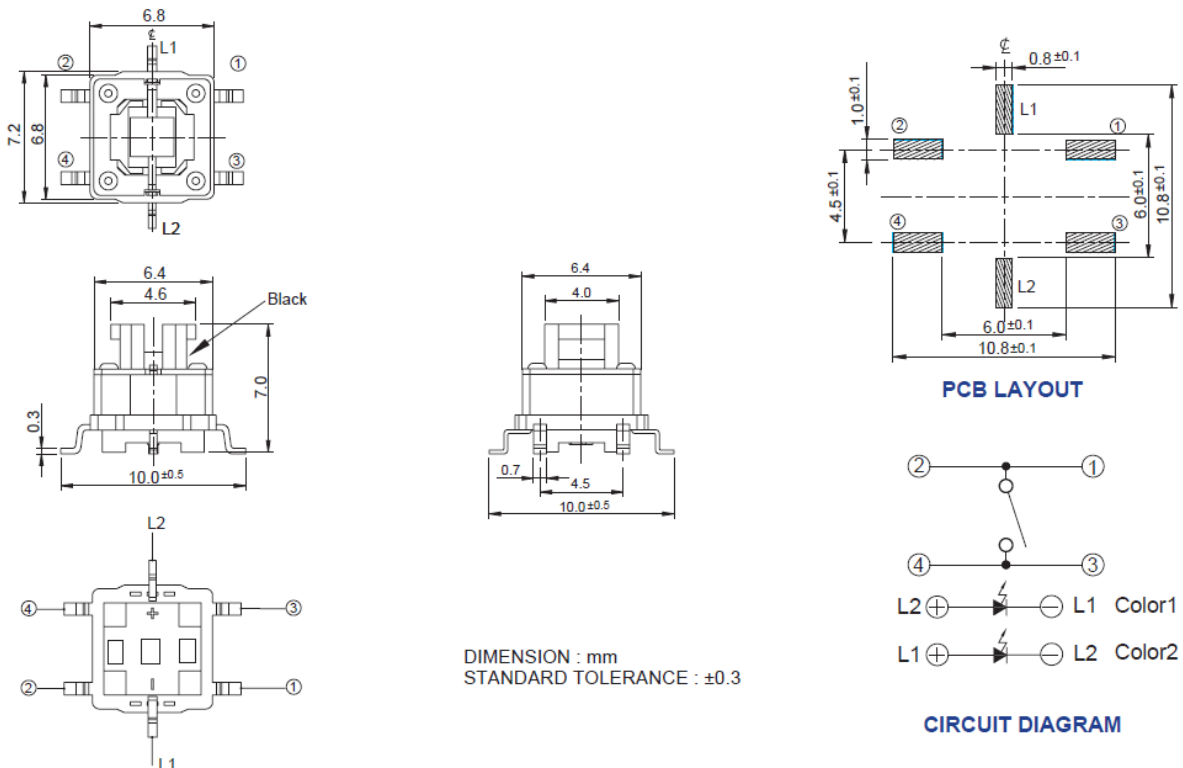
|                             |   |
|-----------------------------|---|
| Soldering                   | Maximum reflow temperature, 260°C for 5 seconds<br>Maximum manual temperature, 350°C for 3 seconds                |
| RoHS                        | Lead-Free. Fully compliant to RoHS Directive 2011/65/EU   |
| Operating Force             | 160gf   |
| Actuation Life              | 100,000 cycles  |
| Actuator Strength           | 2 Kgf maximum   |
| Travel                      | 0.25±0.1mm  |
| Packaging                   | Standard tape and reel packaging for surface mount gull wing terminal<br>Tray packaging for standard through hole |
| Operating Temperature Range | -25°C to +70°C  |
| Storage Temperature Range   | -30°C to +80°C  |

### Mechanical Specifications

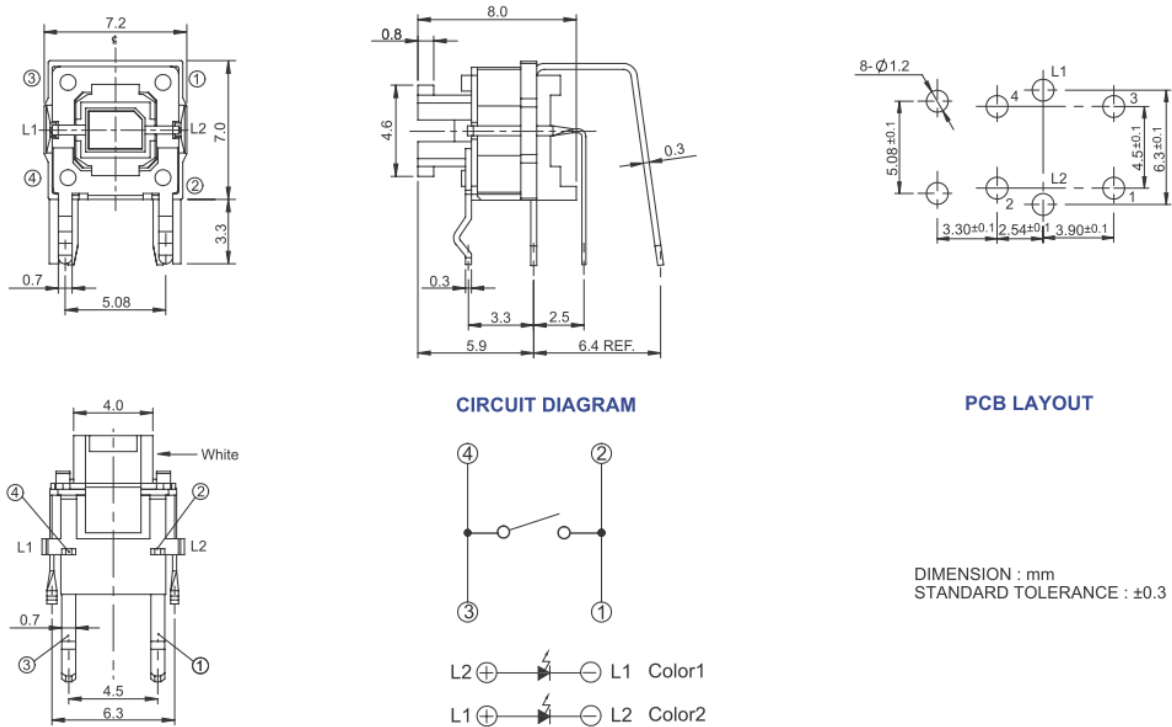
**Figure 1 – 228ADV..., Standard Though Hole, Vertical Actuation**



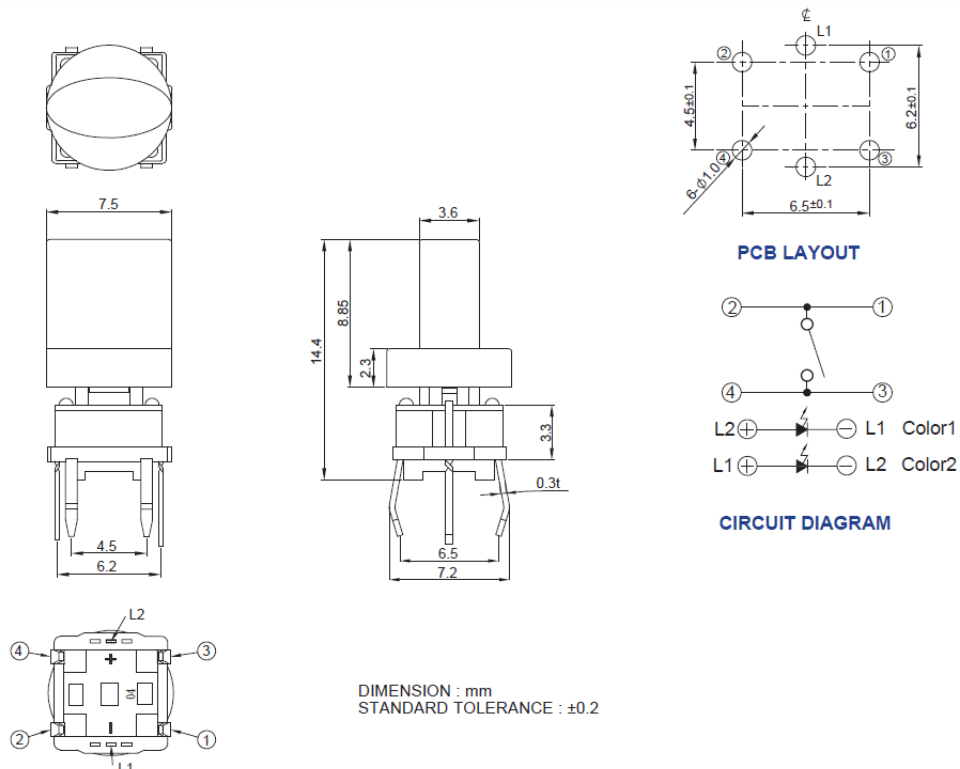
**Figure 2 – 228AMV..., Surface Mount Gull Wing, Vertical Actuation**



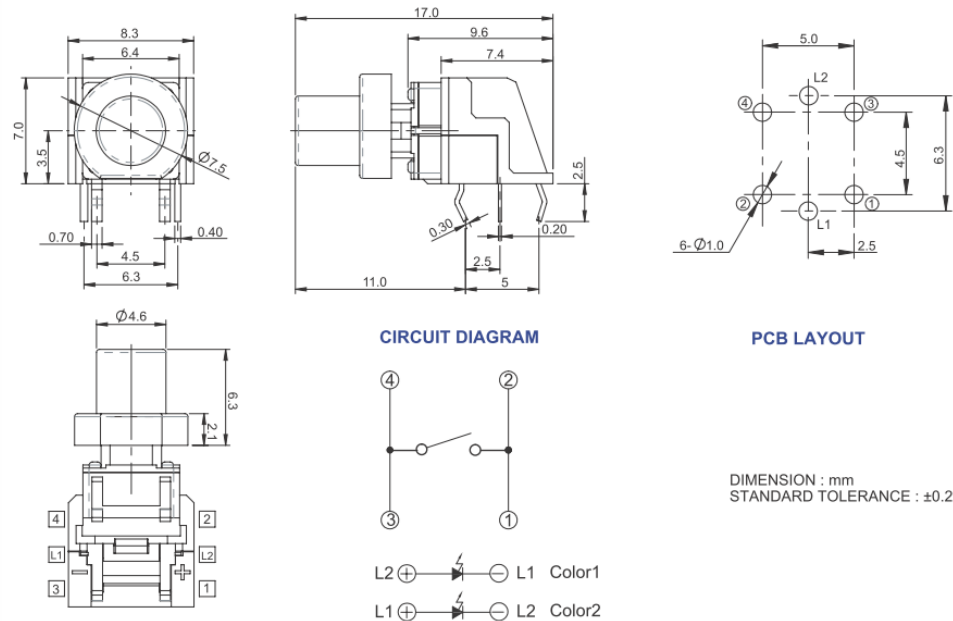
**Figure 3 – 228ADS1..., Standard Though Hole, Side Actuation, 4 Pairs Terminals**



**Figure 4 – 228ADVA...A..., Standard Though Hole, Vertical Actuation, Elliptical Column on Round Cap in Natural Color**



**Figure 5 – 228ADS2...C..., Standard Though Hole, Side Actuation with 3 Pairs Terminals, & Cylinder on Round Cap**

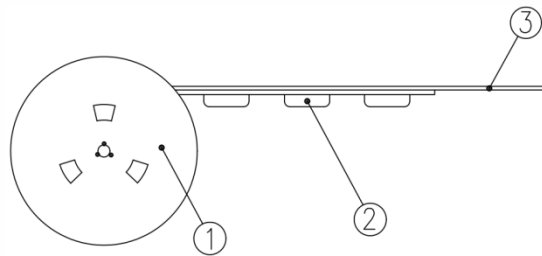


### Packing: Tape and Reel

Surface Mount Gull Wing, Actuator Height 7.0mm

The packing specifications:

1. Structure and materials:



| No | PART NAME    | MATERIAL    |
|----|--------------|-------------|
| ①  | REEL         | POLYSTYRENE |
| ②  | CARRIER TAPE | POLYSTYRENE |
| ③  | COVER TAPE   | POLYESTER   |

2. Packing quantity: 450 pcs/reel
3. More than 15 empty pockets should remain at each end of the carrier tape for each reel.
4. Shortage of less than 10 pcs a reel is acceptable but no more than 3 consecutive empty pockets are allowed.
5. Stripping strength of cover tape is between 10 gf to 130 gf and stripping angle should be within 165°~180°.
6. The product in the pocket of carrier tape should be placed in a specified correct position.
7. Tape and reel per EIA-481.
8. Dimensions:

